INCH-POUND

MIL-M-38510/372B
27 July 2004
SUPERSEDING
MIL-M-38510/372A
12 February 1987

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, BIPOLAR, ADVANCED LOW POWER SCHOTTKY TTL, FLIP-FLOPS CASCADABLE, MONOLITHIC SILICON

Inactive for new design after 8 July 1997.

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF 38535

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, advanced low power Schottky TTL, flip-flops, bistable logic microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided for each type and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).

1.2 Part or Identifying Number (PIN). The PIN is in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types are as follows:

Device type	Circuit
01	Hex D-type flip-flop with clear cascadable
02	Quadruple D-type flip-flop with clear cascadable
03	Octal D-type flip-flop with transparent latch and 3 state outputs cascadable
04	Octal D-type flip-flop with 3 state outputs cascadable

1.2.2 Device class. The device class is the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outlines. The case outlines are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
R	GDIP1-T20 or CDIP2-T20	20	Dual-in-line
S	GDFP2-F20 or CDFP3-F20	20	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, P. O. Box 3990, Columbus, OH 43218-3990, or emailed to bipolar@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to +7.0 V dc
Input voltage range	-1.5 V dc at -18 mA to +7.0 V dc
Storage temperature range	-65° to +150°C
Maximum power dissipation (P_D), per device: 1/	
Device 01	104.5 mW
Device 02	77 mW
Device 03	148.5 mW
Device 04	170.5 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction to case (θ_{JC}):	
Cases E, F, R, S, and 2	(See MIL-STD-1835)
Junction temperature (T_J) 2/	175°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	4.5 V dc minimum to 5.5 V dc maximum
Minimum high level input voltage (V_{IH})	2.0 V dc
Maximum low level input voltage (V_{IL})	0.8 V dc
Normalized fanout (each output) 3/	10 maximum at low logic level 20 maximum at high logic level
Case operating temperature range (T_C)	-55° to +125°C
Minimum width of clock pulse ($t_{P(CLK)}$)	
type 01, 02 25°C	10 ns
-55/125°C	12.5 ns
type 04 25°C	14 ns
-55/125°C	16.5 ns
Minimum width of clear pulse ($t_{P(CLEAR)}$)	
type 01, 02	15 ns
Minimum width of enable pulse ($t_{P(ENABLE)}$)	
type 03	10 ns
Minimum setup time before clock (t_{SETUP})	
type 01, 02	16 ns
type 04	10 ns
Minimum hold time after clock (t_{HOLD})	
type 01, 02	0 ns
type 04	4 ns
Minimum setup time before enable (t_{SETUP})	
type 03	10 ns
Minimum hold time after enable (t_{HOLD})	
type 03	7 ns
Minimum clear inactive state time before clock	
type 01, 02	8 ns

1/ Must withstand the added P_D due to short-circuit test (e.g., I_{OS}).
2/ Maximum junction temperature should not be exceeded except in accordance with allowable short duration burn-in screening condition in accordance with MIL-PRF-38535.
3/ The device should fanout in both high and low levels to the specified number of inputs of the same device type as that being tested.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard for Microelectronics.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or www.dodssp.daps.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Case outlines. The case outlines shall be as specified in 1.2.3.

3.3.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3.3 Logic equations. The logic equations shall be as specified on figure 2.

3.3.4 Truth tables. The truth tables shall be as specified on figure 3.

3.3.5 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity upon request.

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range, unless otherwise specified.

3.6 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 10 (see MIL-PRF-38535, appendix A).

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not effect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535 and shall be conducted on all devices prior to qualification and conformance inspection. The following additional criteria shall apply:

a. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

c. Additional screening for space level product shall be as specified in MIL-PRF-38535.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Device type	Limits		Unit
					Min	Max	
High level output voltage	V_{OH}	V_{CC} = 4.5 V, V_{IH} = 2.0 V, V_{IL} = 0.8 V	I_{OH} = -400 µA	01, 02	2.5		V
			I_{OH} = -1.0 mA	03, 04	2.4		
Low level output voltage	V_{OL}	V_{CC} = 4.5 V, V_{IH} = 2.0 V, V_{IL} = 0.8 V	I_{OL} = 4 mA	01, 02		0.4	V
			I_{OL} = 12 mA	03, 04		0.4	
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{OL} = -18 mA, T_C = +25°C		All		-1.5	V
Low level input current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	D-inputs	01, 02	0	-100	µA
			CLK/CLR		0	-150	
				03, 04	0	-200	
High level input current	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.7 V		All		20	µA
	I_{IH2}	V_{CC} = 5.5 V, V_{IN} = 7.0 V		All		100	µA
Output current, low level, outputs disabled	I_{OZL}	V_{CC} = 5.5 V, V_O = 0.4 V		03, 04		-20	µA
Output current, high level, outputs disabled	I_{OZH}	V_{CC} = 5.5 V, V_O = 2.7 V		03, 04		20	µA
Short circuit output current	I_O	V_{CC} = 5.5 V, V_{OUT} = 2.25 V 1/		All	-20	-112	mA
Supply current	I_{CC}	V_{CC} = 5.5 V, V_{IN} = 4.5 V 2/		01		19	mA
				02		14	
Supply current outputs high	I_{CCH}	V_{CC} = 5.5 V, V_{IN} = 4.5 V		03		16	mA
				04		19	
Supply current outputs low	I_{CCL}	V_{CC} = 5.5 V, V_{IN} = 0 V		03		25	mA
				04		28	
Supply current outputs disabled	I_{CCZ}	V_{CC} = 5.5 V		03		27	mA
				04		31	
Maximum clock frequency	f_{MAX}			01, 02	40		MHz
				04	30		

See footnotes at end of table.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Propagation delay time, low-to-high, CLK to Q	t_{PLH1}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = R1 = 500 Ω	01	3	18	ns
			02	3	17	
			04	4	20	
Propagation delay time, high-to-low, CLK to Q	t_{PHL1}		01	5	20	ns
			02	5	26	
			04	5	18	
Propagation delay time, low-to-high, D to Q	t_{PLH2}		03	2	14	ns
Propagation delay time, high-to-low, D to Q	t_{PHL2}		03	4	19	ns
Propagation delay time, low-to-high, ENC to Q	t_{PLH3}		03	6	21	ns
Propagation delay time, high-to-low, ENC to Q	t_{PHL3}		03	7	21	ns
Propagation delay time, low-to-high, Clear to $\overline{Q}$	t_{PLH4}		02	5	20	ns
Propagation delay time, high-to-low, Clear to Q	t_{PHL4}		01, 02	8	26	ns
Propagation delay time, disable to high level	t_{PZH}		03	5	26	ns
			04	3	22	
Propagation delay time, disable to low level	t_{PZL}		03	6	22	ns
			04	5	20	
Propagation delay time, high level to disable	t_{PHZ}		03	2	12	ns
			04	1	12	
Propagation delay time, low level to disable	t_{PLZ}		03	2	18	ns
			04	2	24	

1/ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

2/ I_{CC} is measured with D inputs and $\overline{CLR}$ grounded.

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, 2, 3, 7, 9, 10, 11	1*, 2, 3, 7, 9
Group A test requirements	1, 2, 3, 7, 8, 9, 10, 11	1, 2, 3, 7, 8, 9, 10, 11
Group B electrical test parameters when using the method 5005 QCI option	1, 2, 3, 9, 10, 11	N/A
Group C end-point electrical parameters	1, 2, 3, 9, 10, 11	1, 2, 3
Group D end-point electrical parameters	1, 2, 3	1, 2, 3

*PDA applies to subgroup 1.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.4 Technology Conformance Inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 4, 5, and 6 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of MIL-PRF-38535.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End-point electrical parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be specified as follows:

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

Terminal number	Device 01		Device 02		Device 03	Device 04
	Cases E and F	Case 2	Cases E and F	Cases 2	Cases R, S, and 2	Cases R, S, and 2
1	$\overline{CLR}$	N/C	$\overline{CLR}$	N/C	$\overline{OC}$	$\overline{OC}$
2	1Q	$\overline{CLR}$	1Q	$\overline{CLR}$	1Q	1Q
3	1D	1Q	$1\overline{Q}$	1Q	1D	1D
4	2D	1D	1D	$1\overline{Q}$	2D	2D
5	2Q	2D	2D	1D	2Q	2Q
6	3D	N/C	$2\overline{Q}$	N/C	3Q	3Q
7	3Q	2Q	2Q	2D	3D	3D
8	GND	3D	GND	$2\overline{Q}$	4D	4D
9	CLK	3Q	CLK	2Q	4Q	4Q
10	4Q	GND	3Q	GND	GND	GND
11	4D	N/C	$3\overline{Q}$	N/C	ENC	CLK
12	5Q	CLK	3D	CLK	5Q	5Q
13	5D	4Q	4D	3Q	5D	5D
14	6D	4D	$4\overline{Q}$	$3\overline{Q}$	6D	6D
15	6Q	5Q	4Q	3D	6Q	6Q
16	V_{CC}	N/C	V_{CC}	N/C	7Q	7Q
17		5D		4D	7D	7D
18		6D		$4\overline{Q}$	8D	8D
19		6Q		4Q	8Q	8Q
20		V_{CC}		V_{CC}	V_{CC}	V_{CC}

FIGURE 1. Terminal connections.

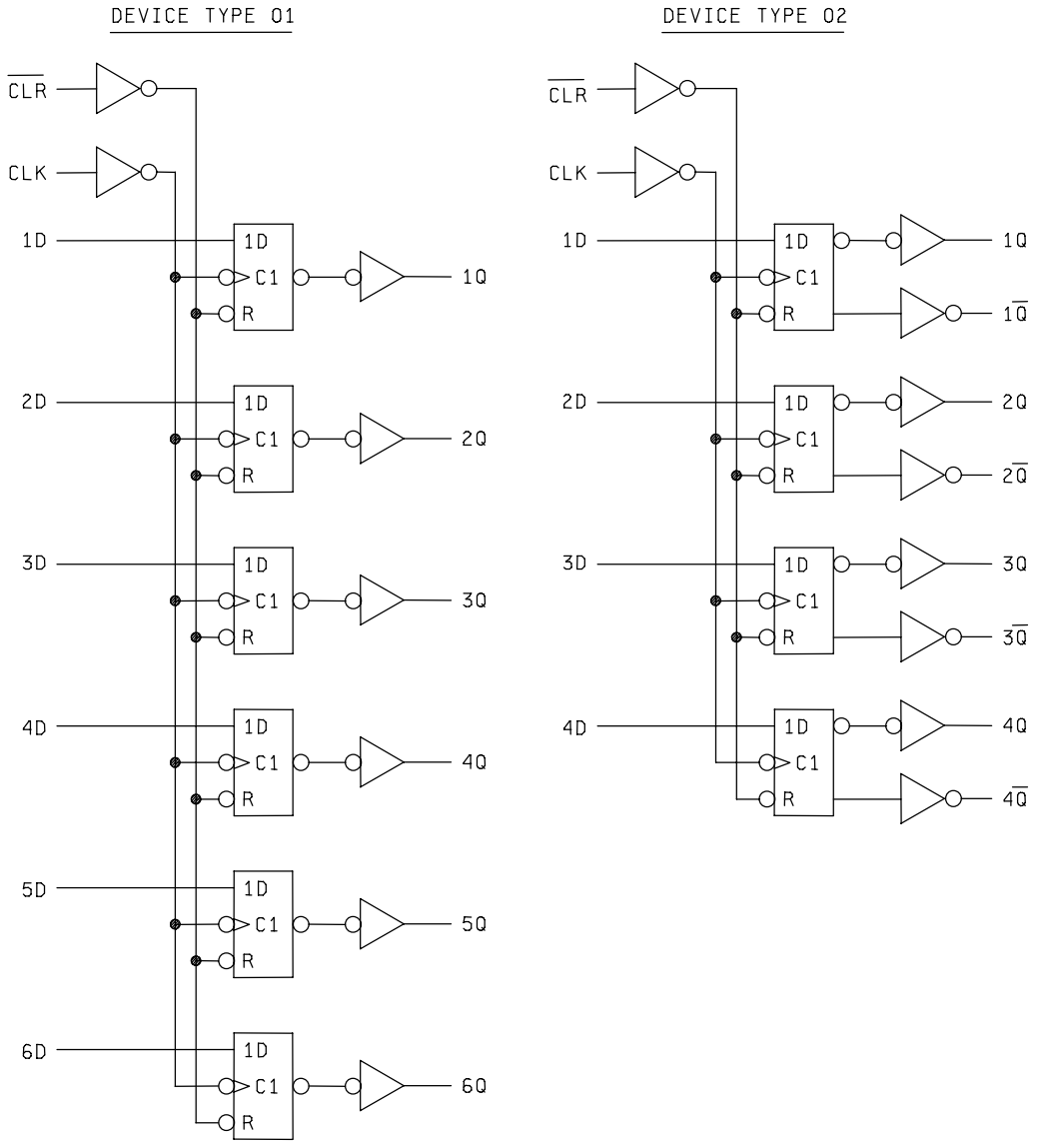


FIGURE 2. Logic diagrams.

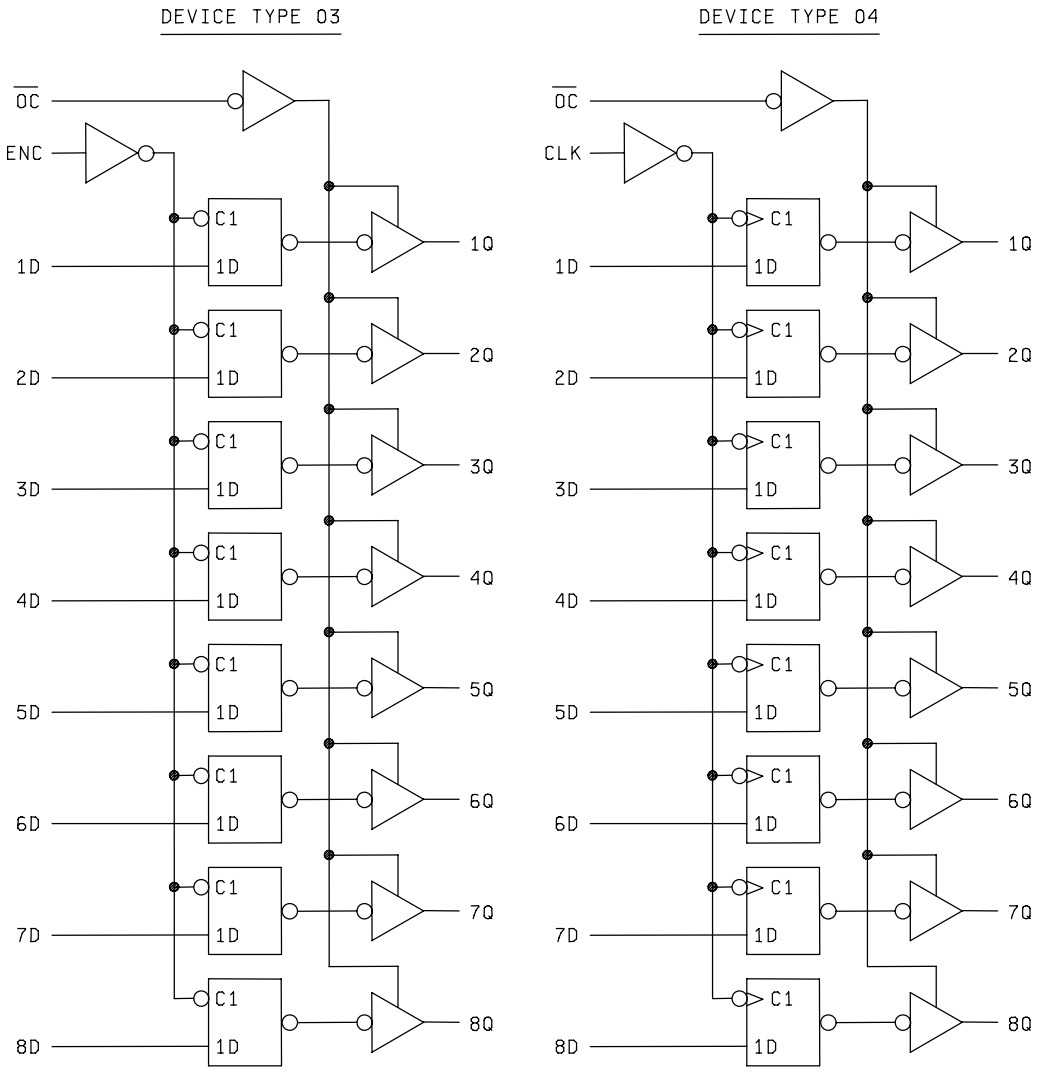


FIGURE 2. Logic diagrams - Continued.

Device type 01

INPUTS			OUTPUT
$\overline{CLR}$	CLK	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q0

Device type 02

INPUTS			OUTPUT	
$\overline{CLR}$	CLK	D	Q	$\overline{Q}$
L	X	X	L	H
H	↑	H	H	L
H	↑	L	L	H
H	L	X	Q0	$\overline{Q}$ 0

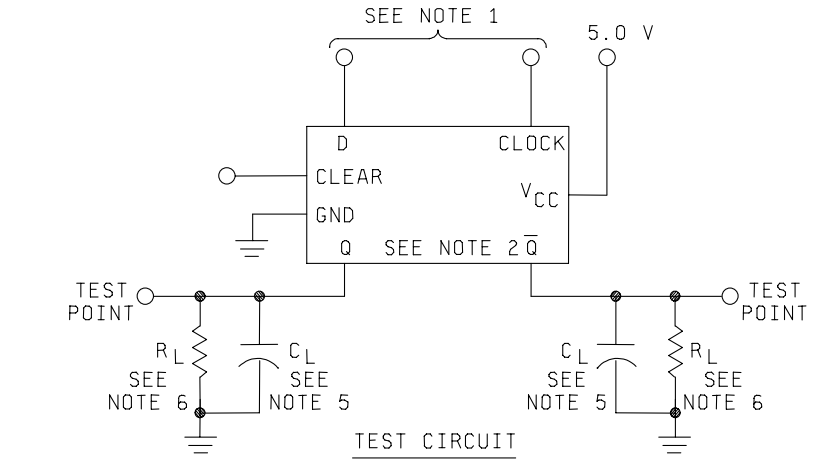
Device type 03

INPUTS			OUTPUT
$\overline{OC}$	ENC	D	Q
L	H	H	H
L	H	L	L
L	L	X	Q0
H	X	X	Z

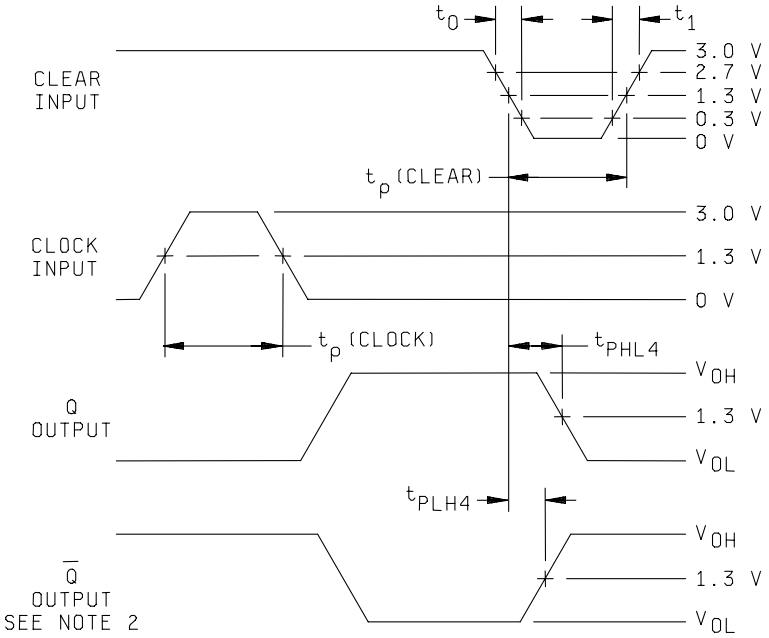
Device type 04

INPUTS			OUTPUT
$\overline{OC}$	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	L	X	Q0
H	X	X	Z

FIGURE 3. Truth tables.



TEST CIRCUIT



VOLTAGE WAVEFORM

NOTES:

1. Clear input dominates regardless of the state of clock or D inputs.
2. $\overline{Q}$ output applies to device type 02 only.
3. Clear input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{P(CLEAR)} = 15$ ns; PRR ≤ 1.0 MHz.
4. Inputs not under test are at ground.
5. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
6. $R_L = 499\Omega$ ±1%.
7. Clock input pulse characteristics: $t_{P(CLK)} \geq 12.5$ ns, PRR ≤ 1.0 MHz.
8. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 4. A synchronous switching test circuit for device types 01 and 02.

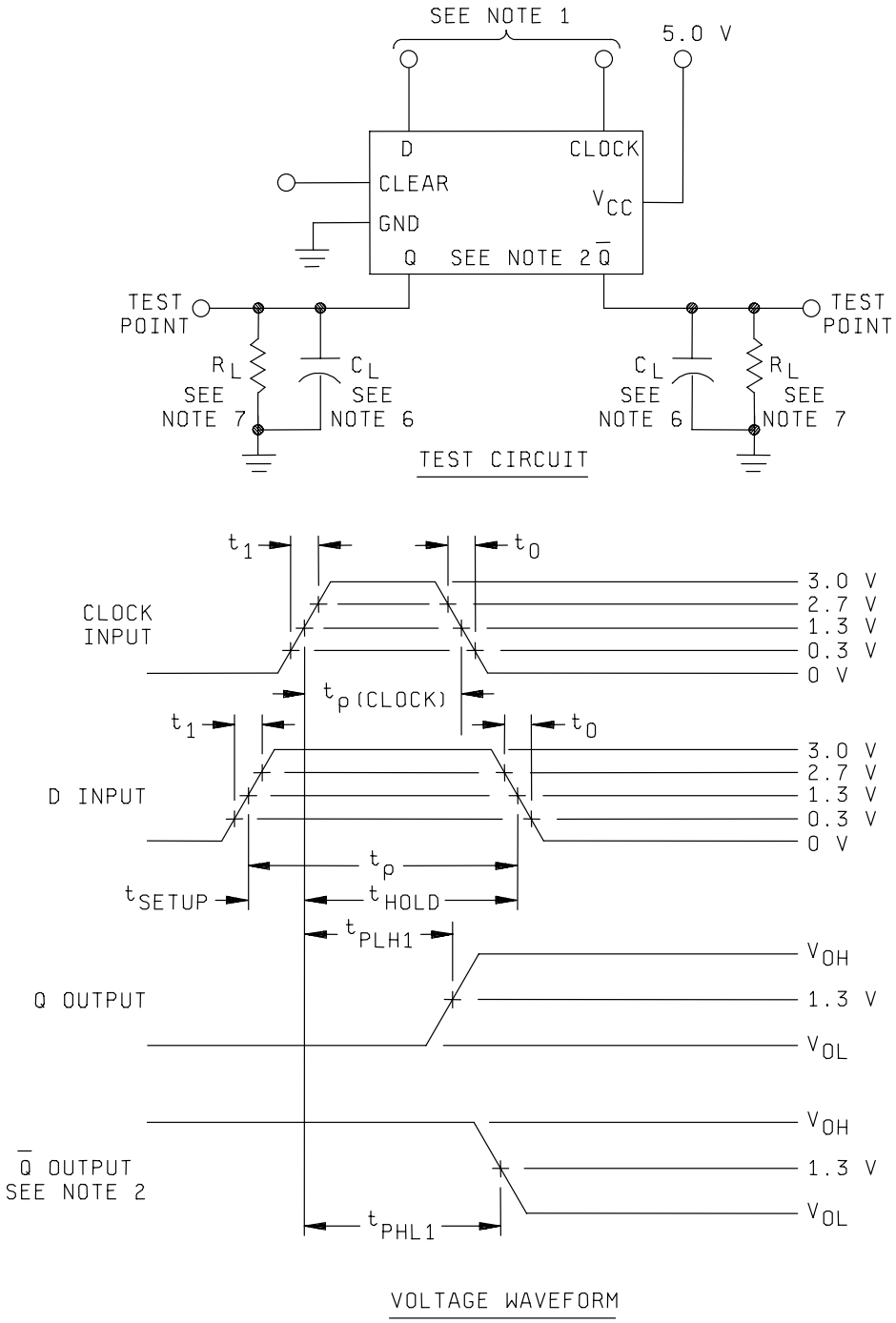
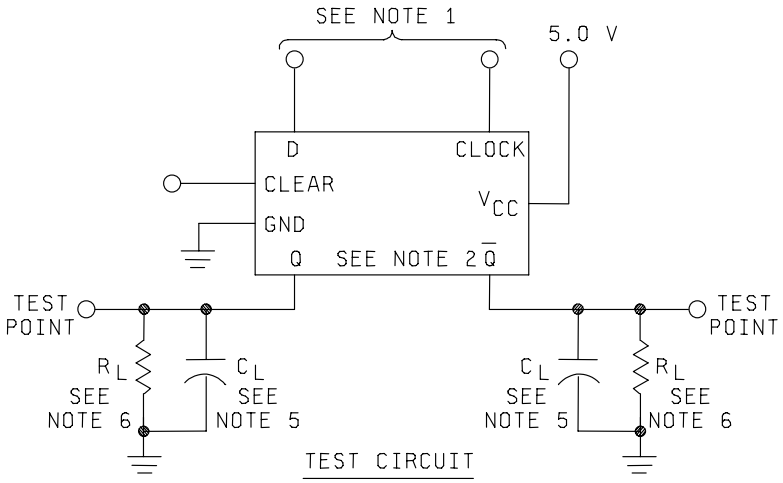


FIGURE 4. Synchronous switching test circuit (high-level data) types 01 and 02 - Continued.

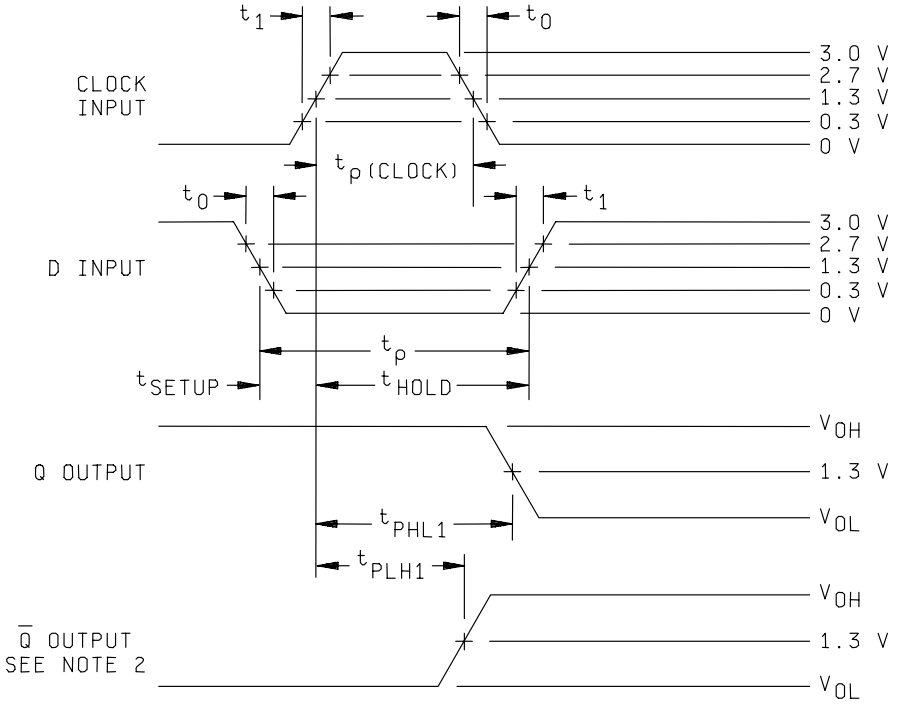
NOTES:

1. Clock input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{P(CLK)} = 12.5$ ns; PRR $\leq$ 1.0 MHz.
2. $\overline{Q}$ output applies to device type 02 only.
3. D input pulse characteristics: $t_1 = t_0 = 6 \pm 1$ ns; $t_{(SETUP)} = 15$ ns; $t_{(HOLD)} = 0$ ns; $t_P = 15$ ns; PRR is 50% of clock PRR.
4. For f_{MAX}, the clock input pulse characteristics are as follows: $t_1 = t_0 \leq 3$ ns; for 25°C, $t_{P(CLK)} = 10$ ns; PRR = 50 MHz; for -55/125°C, $t_{P(CLK)} = 12.5$ ns, PRR = 40 MHz. The D input pulse shall be one-half of the frequency of the clock and the D $\uparrow$ and $\downarrow$ shall be coincident with the clock $\downarrow$, but may be offset sufficiently to assure adequate t_{SETUP} and t_{HOLD} (see 1.4). $t_1 = t_0 \leq 3$ns.
5. Inputs not under test are at ground.
6. $C_L = 50$ pF $\pm$10%, including scope probe, wiring, and stray capacitance without package in test fixture.
7. $R_L = 499\Omega \pm 1\%$.
8. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 4. Synchronous switching test circuit (high-level data) types 01 and 02 - Continued.



TEST CIRCUIT

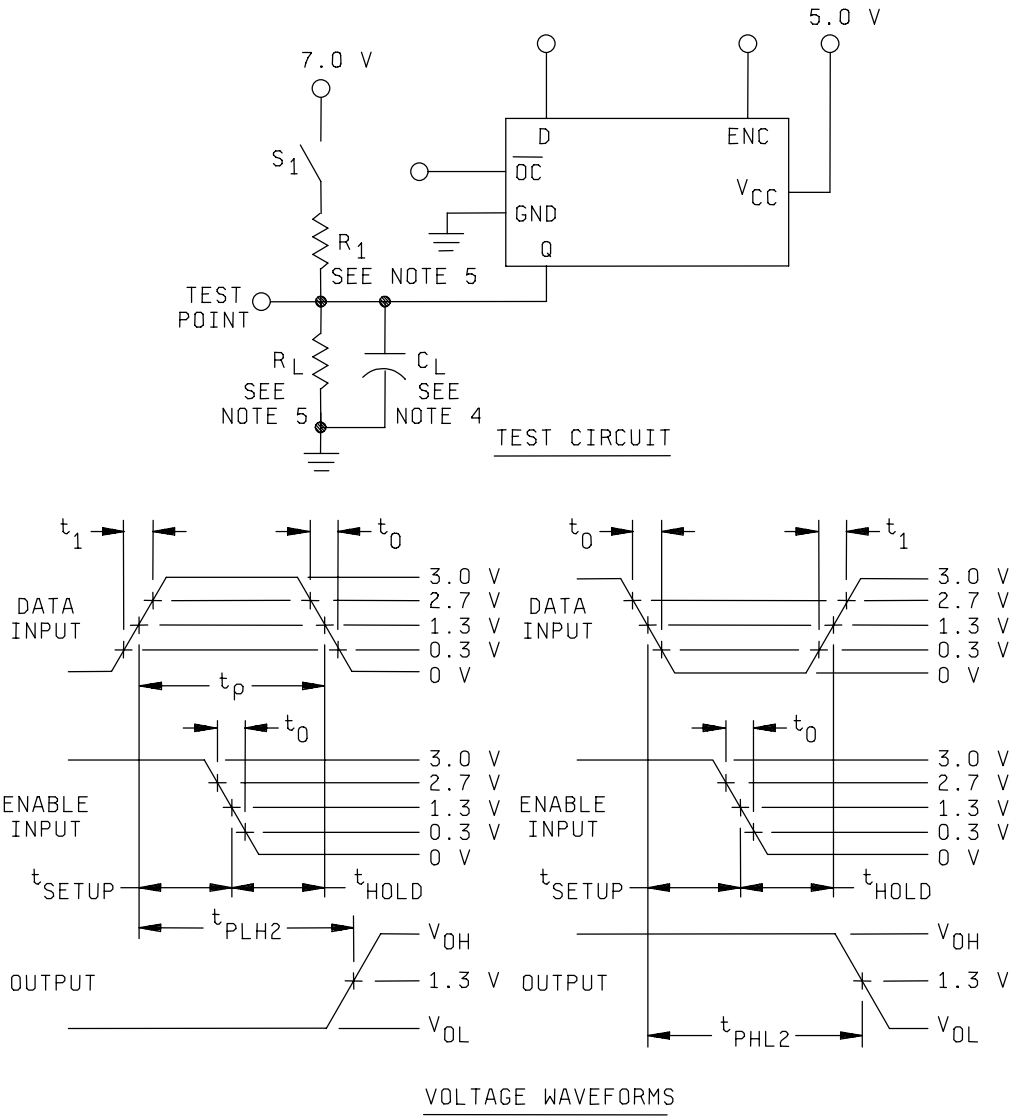


VOLTAGE WAVEFORM

NOTES:

1. Clock input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; PRR ≤ 1.0 MHz.
2. $\overline{Q}$ output applies to device type 02 only.
3. D input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{(SETUP)} = 15$ ns; $t_{(HOLD)} = 0$ ns; PRR is 50% of clock PRR.
4. Inputs not under test are at ground.
5. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
6. $R_L = 499\Omega \pm 1\%$.
7. Voltage measurements are to be made with respect to network ground terminal.

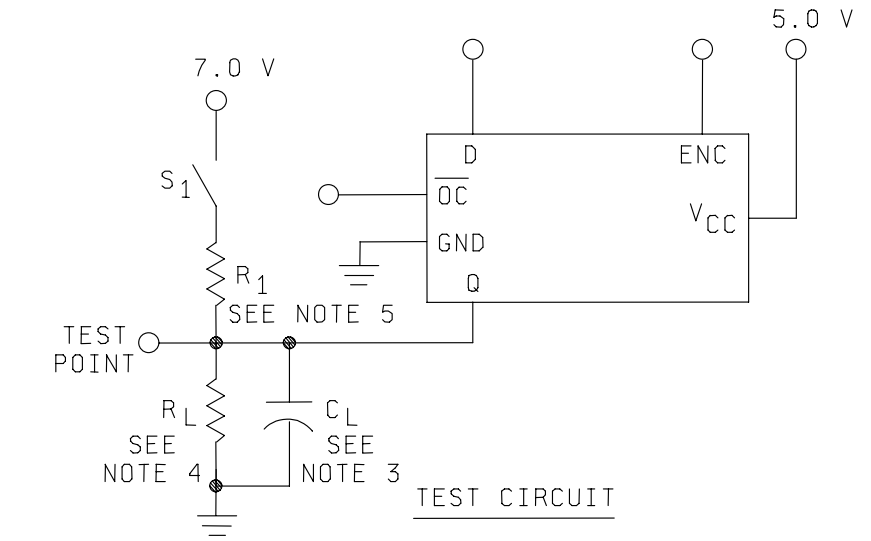
FIGURE 4. Synchronous switching test circuit (low-level data) types 01 and 02 - Continued.

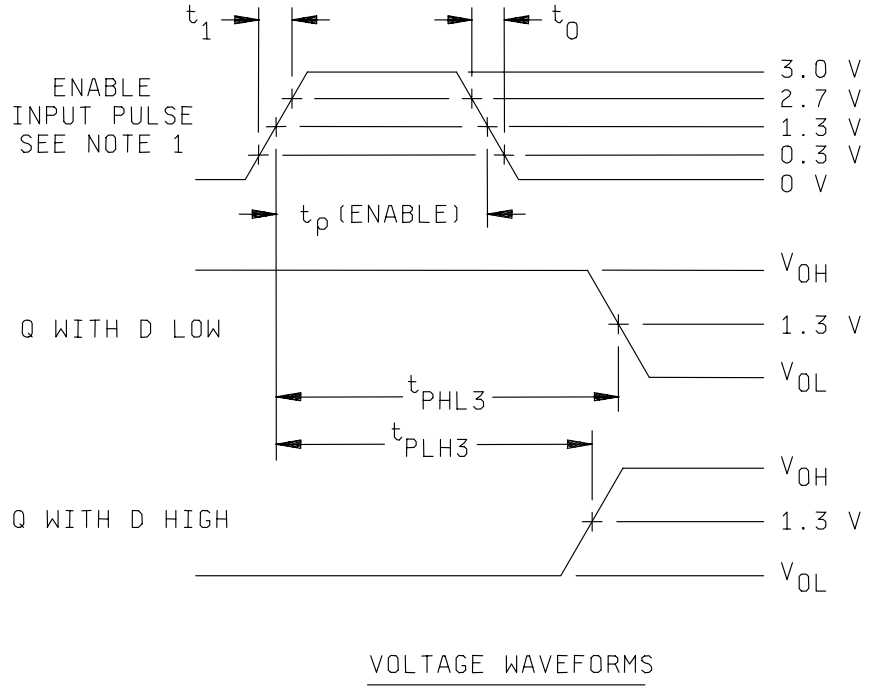


NOTES:

1. Enable input pulse characteristics: $t_0 = 6 \pm 1.5$ ns .
2. D input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{(SETUP)} = 10$ ns; $t_{(HOLD)} = 7$ ns; $t_P = 17$ ns.
3. Inputs not under test are at ground.
4. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
5. $R_L = R1 = 499\Omega \pm 1\%$.
6. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 5. Switching time circuit, type 03.



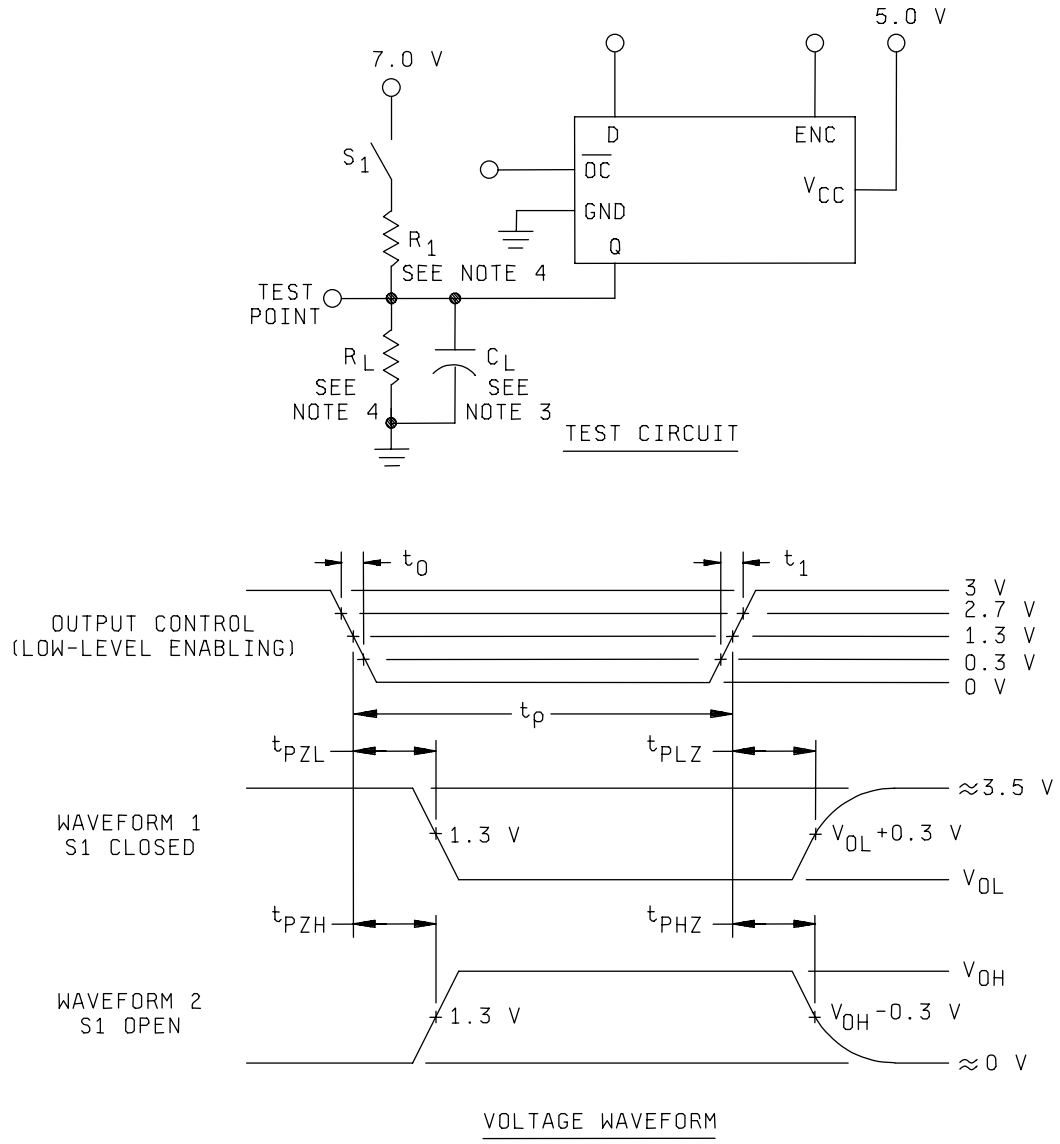


VOLTAGE WAVEFORMS

NOTES:

1. Enable input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_P = 10$ ns; PRR ≤ 1 MHz.
2. Inputs not under test are at ground.
3. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
4. $R_L = R1 = 499\Omega \pm 1\%$.
5. Voltage measurements are to be made with respect to network ground terminal.

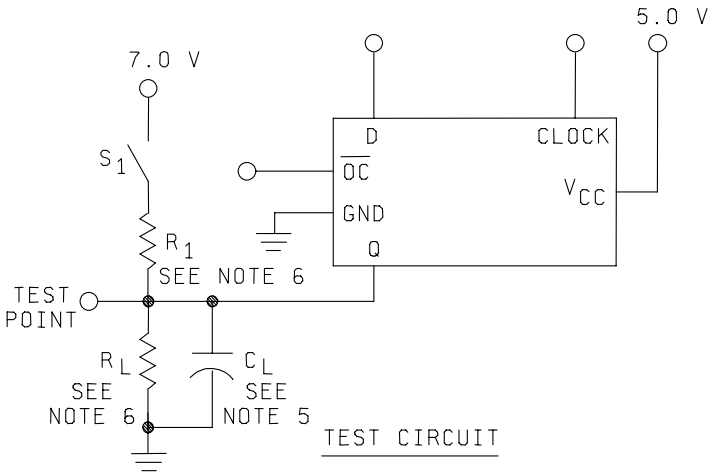
FIGURE 5. Switching test circuit, type 03 - Continued.



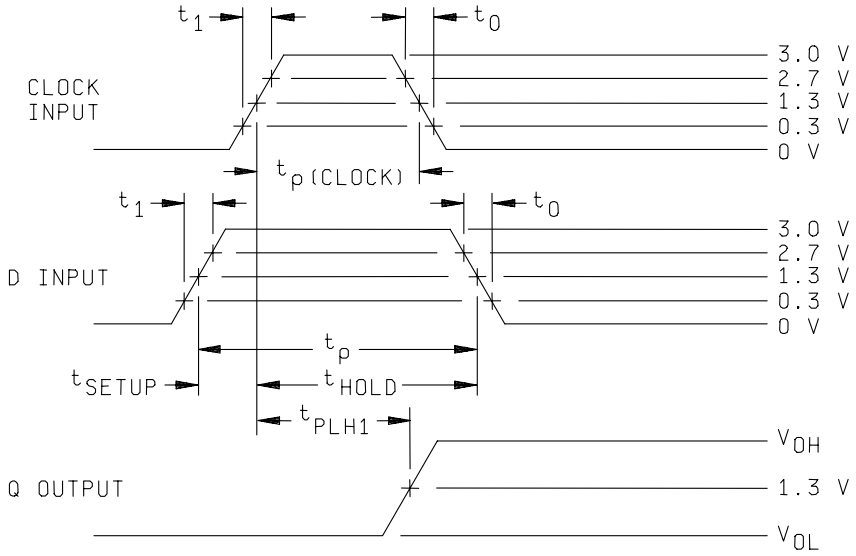
NOTES:

1. Output control input pulse characteristics: $t_1 = t_0 = 6 = \pm 1.5$ ns; $t_P = 200$ ns; PRR ≤ 1 MHz.
2. Inputs not under test are at ground.
3. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
4. $R_L = R1 = 499\Omega \pm 1\%$.
5. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 5. Three-state switching test circuit, type 03 - Continued.



TEST CIRCUIT

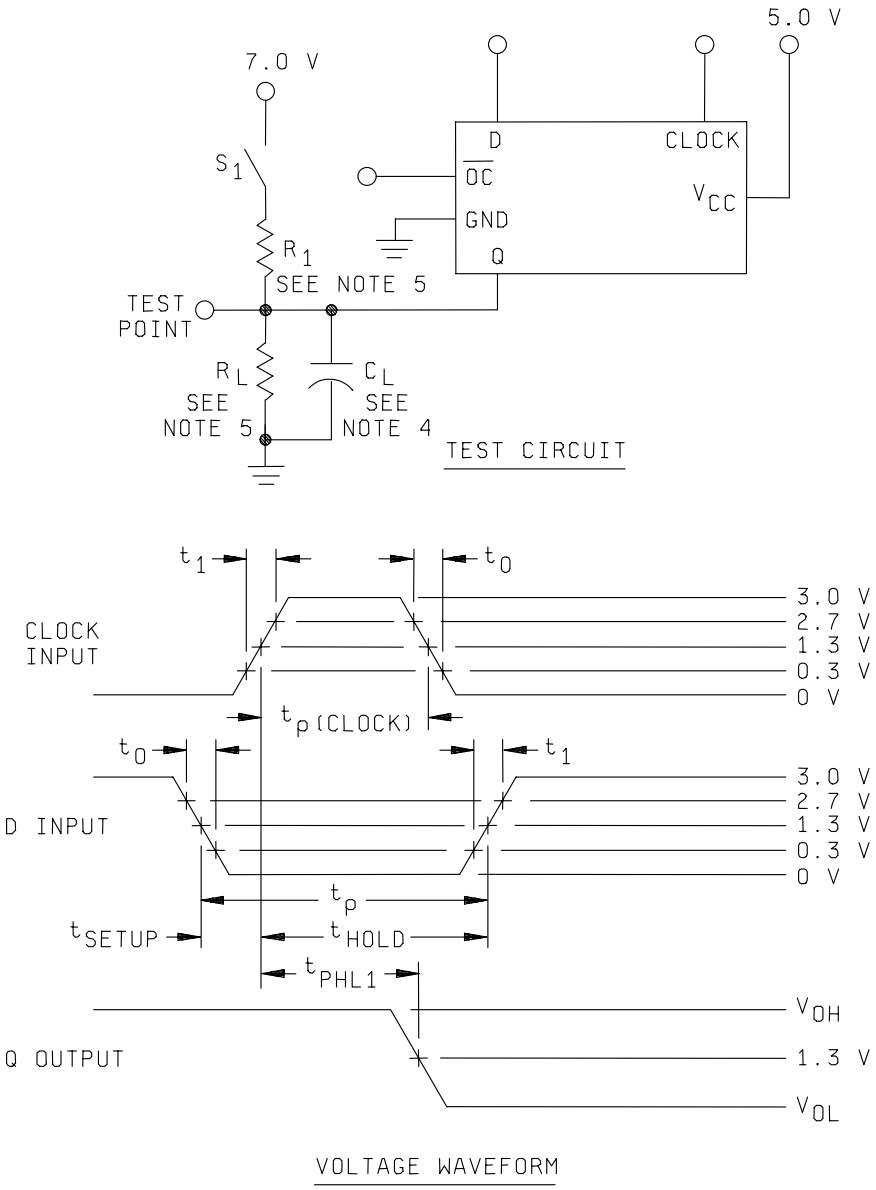


VOLTAGE WAVEFORM

NOTES:

1. Clock input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{P(CLK)} = 16.5$ ns; PRR ≤ 1.0 MHz.
2. D input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{(SETUP)} = 10$ ns; $t_{(HOLD)} = 4$ ns; $t_P = 14$ ns; PRR is 50% of clock PRR.
3. For f_{MAX}, the clock input pulse characteristics are as follows: $t_1 = t_0 \leq 3$ ns; for 25°C, $t_{P(CLK)} = 14$ ns; PRR = 35 MHz; for -55/125°C, $t_{P(CLK)} = 16.5$ ns, PRR = 30 MHz. The D input pulse shall be one-half of the frequency of the clock and the D ↑ and ↓ shall be coincident with the clock ↓, but may be offset sufficiently to assure adequate t_{SETUP} and t_{HOLD} (see 1.4). $t_1 = t_0 \leq 3$ns.
4. Inputs not under test are at ground.
5. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
6. $R_L = R_1 = 499\Omega \pm 1\%$.
7. Voltage measurements are to be made with respect to network ground terminal.

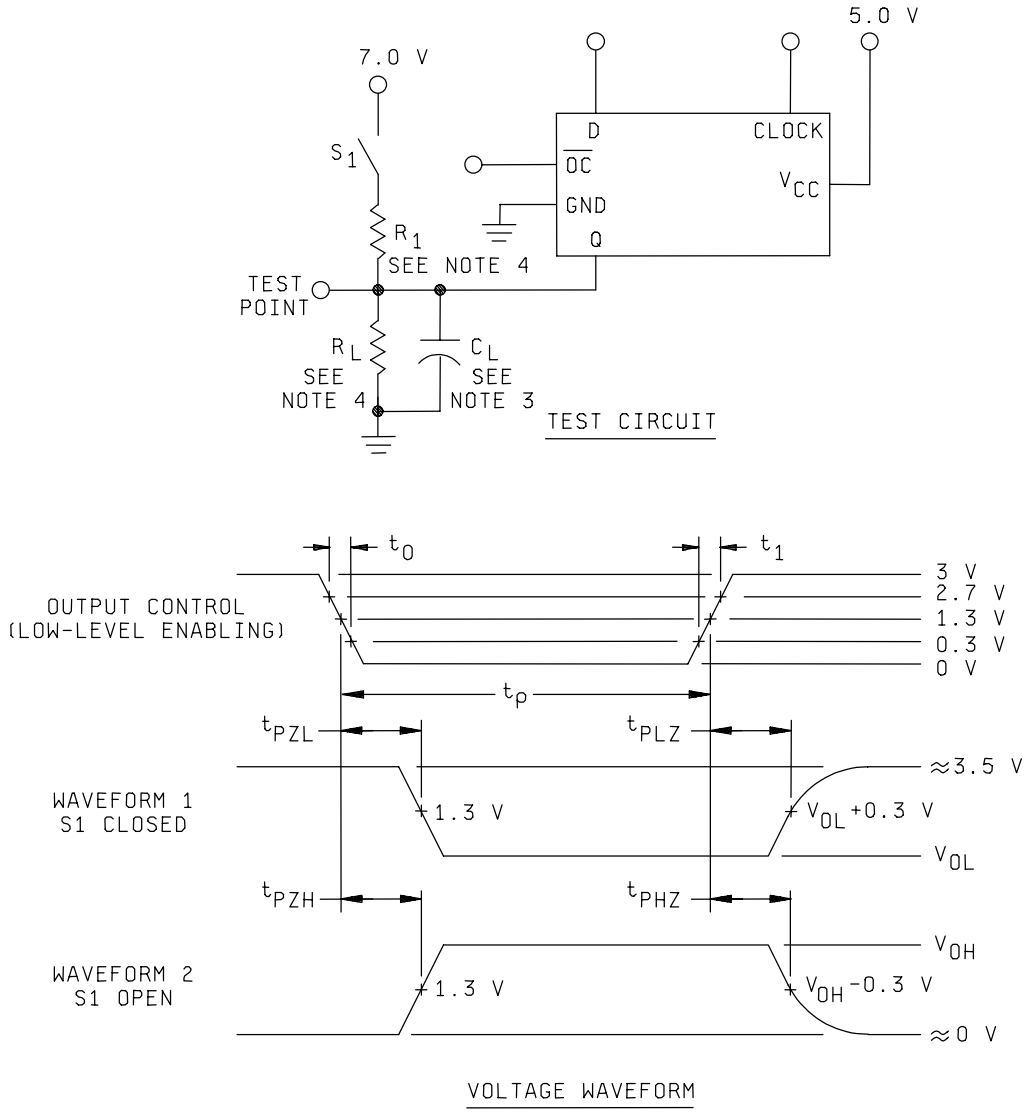
FIGURE 5. Synchronous switching test circuit (high level data) type 04.



NOTES:

1. Clock input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{P(CLK)} = 16.5$ ns; PRR $\leq$ 1.0 MHz.
2. D input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_{(SETUP)} = 10$ ns; $t_{(HOLD)} = 4$ ns; $t_P = 14$ ns; PRR is 50% of clock PRR.
3. Inputs not under test are at ground.
4. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
5. $R_L = R_1 = 499\Omega \pm 1\%$.
6. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 5. Synchronous switching test circuit (low level data) type 04 - Continued.



NOTES:

1. $\overline{OC}$ input pulse characteristics: $t_1 = t_0 = 6 \pm 1.5$ ns; $t_P \geq 200$ ns; PRR ≤ 1 MHz.
2. Inputs not under test are at ground.
3. $C_L = 50$ pF ±10%, including scope probe, wiring, and stray capacitance without package in test fixture.
4. $R_L = R_1 = 499\Omega \pm 1\%$.
5. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 6. Three-state switching test circuit, type 04 - Continued.

TABLE III. Group A inspection for device type 01.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit
			Case 2 1/	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20				
			Test no.	$\overline{CLR}$	1Q	1D	2D	2Q	3D	3Q	GND	CLK	4Q	4D	5Q	5D	6D	6Q	V_{CC}		Min	Max	
1 Tc = 25°C	V_{OH}	3006	1	2.0 V	-400 µA	2.0 V					GND	2/							4.5 V	1Q	2.5		V
		"	2	"			2.0 V	-400 µA			"	"							"	2Q	"		"
		"	3	"					2.0 V	-400 µA	"	"							"	3Q	"		"
		"	4	"							"	"	-400 µA	2.0 V					"	4Q	"		"
		"	5	"							"	"			-400 µA	2.0 V			"	5Q	"		"
		"	6	"							"	"					2.0 V	-400 µA	"	6Q	"		"
	V_{OL}	3007	7	"	4 mA	0.8 V					"	"							"	1Q		0.4	"
		"	8	"			0.8 V	4 mA			"	"							"	2Q		"	"
		"	9	"					0.8 V	4 mA	"	"							"	3Q		"	"
		"	10	"							"	"	4 mA	0.8 V					"	4Q		"	"
		"	11	"							"	"			4 mA	0.8 V			"	5Q		"	"
		"	12	"							"	"					0.8 V	4 mA	"	6Q		"	"
	V_{IC}		13	-18 mA							"								"	$\overline{CLR}$		-1.5	"
			14			-18 mA					"								"	1D		"	"
			15				-18 mA				"								"	2D		"	"
			16						-18 mA		"								"	3D		"	"
			17								"	-18 mA							"	CLK		"	"
			18								"			-18 mA					"	4D		"	"
			19								"					-18 mA			"	5D		"	"
			20								"						-18 mA		"	6D		"	"
	I_{IL}	3009	21	0.4 V							"								5.5 V	$\overline{CLR}$	3/	3/	µA
		"	22			0.4 V					"								"	1D	"	"	"
		"	23				0.4 V				"								"	2D	"	"	"
		"	24						0.4 V		"								"	3D	"	"	"
		"	25								"	0.4 V							"	CLK	"	"	"
		"	26								"			0.4 V					"	4D	"	"	"
		"	27								"					0.4 V			"	5D	"	"	"
		"	28								"						0.4 V		"	6D	"	"	"
	I_{IH1}	3010	29	2.7 V							"								"	$\overline{CLR}$		20	"
		"	30			2.7 V					"								"	1D		"	"
		"	31				2.7 V				"								"	2D		"	"
		"	32						2.7 V		"								"	3D		"	"
		"	33								"	2.7 V							"	CLK		"	"
		"	34								"			2.7 V					"	4D		"	"
		"	35								"					2.7 V			"	5D		"	"
		"	36								"						2.7 V		"	6D		"	"
	I_{IH2}	"	37	7.0 V							"								"	$\overline{CLR}$		100	"
		"	38			7.0 V					"								"	1D		"	"
		"	39				7.0 V				"								"	2D		"	"
		"	40						7.0 V		"								"	3D		"	"
		"	41								"	7.0 V							"	CLK		"	"
		"	42								"			7.0 V					"	4D		"	"
		"	43								"					7.0 V			"	5D		"	"
		"	44								"						7.0 V		"	6D		"	"
	I_O 4/	3011	45	4.5 V	2.25 V	4.5 V					"	2/							"	1Q	-20	-112	mA
		"	46				4.5 V	2.25 V			"	"							"	2Q	"	"	"
		"	47						4.5 V	2.25 V	"	"							"	3Q	"	"	"
		"	48								"	"	2.25 V	4.5 V					"	4Q	"	"	"
		"	49								"	"			2.25 V	4.5 V			"	5Q	"	"	"
		"	50								"	"					4.5 V	2.25 V	"	6Q	"	"	"

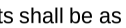
See footnotes at end of table III.

TABLE III. Group A inspection for device type 01 - Continued.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit
			Case 2 1/	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20				
			Test no.	$\overline{CLR}$	1Q	1D	2D	2Q	3D	3Q	GND	CLK	4Q	4D	5Q	5D	6D	6Q	V_{CC}		Min	Max	
1 Tc = 25°C	I_{CC}	3005	51	GND		GND	GND		GND		GND			GND		GND	GND		5.5 V	V_{CC}		19	mA
2	Same tests, terminal conditions, and limits as subgroup 1, except T_C = +125°C and V_{IC} tests are omitted.																						
3	Same tests, terminal conditions, and limits as subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																						
7 T_C = 25°C	Truth table tests	3014	52	B 6/	L	A 6/	A	L	A	L	GND	B	L	A	L	A	A	L	4.5 V	7/			
	"	"	53	A	L	A	A	L	A	L	"	B	L	A	L	A	A	L	"				
	"	"	54	"	H	A	A	H	A	H	"	A	H	A	H	A	A	H	"				
	"	"	55	"	H	B	B	H	B	H	"	B	H	B	H	B	B	H	"				
	"	"	56	"	L	B	B	L	B	L	"	A	L	B	L	B	B	L	"				
	"	"	57	"	L	B	B	L	B	L	"	B	L	B	L	B	B	L	"				
8	Same tests and terminal conditions as subgroup 7, except T_C = +125°C and -55°C.																						
9 Tc = 25°C	f_{MAX} 3/	3003 (fig. 4)	58	3.0 V	OUT	IN					GND	IN							5.0 V	1Q	50		MHz
	"	"	59	"			IN	OUT			"	"							"	2Q	"		"
	"	"	60	"					IN	OUT	"	"							"	3Q	"		"
	"	"	61	"							"	"	OUT	IN					"	4Q	"		"
	"	"	62	"							"	"			OUT	IN			"	5Q	"		"
	"	"	63	"							"	"					IN	OUT	"	6Q	"		"
	t_{PLH1}	"	64	"	OUT	IN					"	"							"	CLK to 1Q	3	15	ns
	"	"	65	"			IN	OUT			"	"							"	CLK to 2Q	"	"	"
	"	"	66	"					IN	OUT	"	"							"	CLK to 3Q	"	"	"
	"	"	67	"							"	"	OUT	IN					"	CLK to 4Q	"	"	"
	"	"	68	"							"	"			OUT	IN			"	CLK to 5Q	"	"	"
	"	"	69	"							"	"					IN	OUT	"	CLK to 6Q	"	"	"
	t_{PHL1}	"	70	"	OUT	IN					"	"							"	CLK to 1Q	5	17	"
	"	"	71	"			IN	OUT			"	"							"	CLK to 2Q	"	"	"
	"	"	72	"					IN	OUT	"	"							"	CLK to 3Q	"	"	"
	"	"	73	"							"	"	OUT	IN					"	CLK to 4Q	"	"	"
	"	"	74	"							"	"			OUT	IN			"	CLK to 5Q	"	"	"
	"	"	75	"							"	"					IN	OUT	"	CLK to 6Q	"	"	"
	t_{PHL4}	"	76	IN	OUT	3.0 V					"	2/							"	CLR to 1Q	8	23	"
	"	"	77				3.0 V	OUT			"	"							"	CLR to 2Q	"	"	"
	"	"	78						3.0 V	OUT	"	"							"	CLR to 3Q	"	"	"
	"	"	79								"	"	OUT	3.0 V					"	CLR to 4Q	"	"	"
	"	"	80								"	"			OUT	3.0 V			"	CLR to 5Q	"	"	"
	"	"	81								"	"					3.0 V	OUT	"	CLR to 6Q	"	"	"
10	f_{MAX}	Same tests and terminal conditions as for subgroup 9, except T_C = +125°C.																			40		MHz
	t_{PLH1}																				3	18	ns
	t_{PHL1}																				5	20	"
	t_{PHL4}																				8	26	"
11	Same tests, terminal conditions and limits as for subgroup 10, except T_C = -55°C.																						

1/ Terminals not referenced are N/C.

2/ Apply  2.0 V min/4.5 V max (pulse, prior to test).
-- 0 V

3/ I_{IL} limits shall be as follows:

Parameters		Min/Max limits in µA for circuit		
		A	B	C
I_{IL}	D-inputs	0/-100		
	CLK/CLR	0/-150		

4/ Method 3011 of MIL-STD-883 shall be used, except the output shall be as specified herein, and the output current shall be operating rather than short circuit current. The output conditions have been chosen to produce a current that closely approximates one half of the true short circuit output current, I_{OS}.

5/ Tests shall be performed in sequence, attributes data only.

6/ A = 2.4 V minimum, B = 0.4 V.

7/ H > 1.5 V, L < 1.5 V.

8/ f_{MAX} minimum limit specified is the frequency of the input pulse. The output frequency shall be one-half of the input frequency.

TABLE III. Group A inspection for device type 02.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit
			Case 2 1/	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20				
			Test no.	$\overline{CLR}$	1Q	1 $\overline{Q}$	1D	2D	2 $\overline{Q}$	2Q	GND	CLK	3Q	3 $\overline{Q}$	3D	4D	4 $\overline{Q}$	4Q	V_{CC}		Min	Max	
1	V_{OH}	3006	1	0.8 V		-400 µA					GND								4.5 V	1 $\overline{Q}$	2.5		V
Tc = 25°C		"	2	"					-400 µA		"								"	2 $\overline{Q}$	"		"
		"	3	"							"			-400 µA					"	3 $\overline{Q}$	"		"
		"	4	"							"						-400 µA		"	4 $\overline{Q}$	"		"
		"	5	2.0 V	-400 µA		2.0 V				"	2/							"	1Q	"		"
		"	6	"				2.0 V		-400 µA	"	"							"	2Q	"		"
		"	7	"							"	"	-400 µA		2.0 V				"	3Q	"		"
		"	8	"							"	"				2.0 V		-400 µA	"	4Q	"		"
		"	9	"		-400 µA	0.8 V				"	"							"	1 $\overline{Q}$	"		"
		"	10	"				0.8 V	-400 µA		"	"							"	2 $\overline{Q}$	"		"
		"	11	"							"	"		-400 µA	0.8 V				"	3 $\overline{Q}$	"		"
		"	12	"							"	"				0.8 V	-400 µA		"	4 $\overline{Q}$	"		"
	V_{OL}	3007	13	0.8 V	4 mA						"								"	1Q		0.4	"
		"	14	"						4 mA	"								"	2Q		"	"
		"	15	"							"		4 mA						"	3Q		"	"
		"	16	"							"							4 mA	"	4Q		"	"
		"	17	2.0 V		4 mA	2.0 V				"	2/							"	1 $\overline{Q}$		"	"
		"	18	"				2.0 V	4 mA		"	"							"	2 $\overline{Q}$		"	"
		"	19	"							"	"		4 mA	2.0 V				"	3 $\overline{Q}$		"	"
		"	20	"							"	"				2.0 V	4 mA		"	4 $\overline{Q}$		"	"
		"	21	"	4 mA		0.8 V				"	"							"	1Q		"	
		"	22	"				0.8 V		4 mA	"	"							"	2Q		"	"
		"	23	"							"	"	4 mA		0.8 V				"	3Q		"	"
		"	24	"							"	"				0.8 V		4 mA	"	4Q		"	"
	V_{IC}		25	-18 mA							"								"	$\overline{CLR}$		-1.5	"
			26			-18 mA					"								"	1D		"	"
			27				-18 mA				"								"	2D		"	"
			28								"	-18 mA							"	CLK		"	"
			29								"				-18 mA				"	3D			"
			30								"					-18 mA			"	4D		"	"
	I_{IL}	3009	31	0.4 V							"								5.5 V	$\overline{CLR}$	3/	3/	µA
		"	32				0.4 V				"								"	1D	"	"	"
		"	33					0.4 V			"								"	2D	"	"	"
		"	34								"	0.4 V							"	CLK	"	"	"
		"	35								"				0.4 V				"	3D	"	"	"
		"	36								"					0.4 V			"	4D	"	"	"
	I_{IH1}	3010	37	2.7 V							"								"	$\overline{CLR}$		20	"
		"	38				2.7 V				"								"	1D		"	"
		"	39					2.7 V			"								"	2D		"	"
		"	40								"	2.7 V							"	CLK		"	"
		"	41								"				2.7 V				"	3D		"	"
		"	42								"					2.7 V			"	4D		"	"

See footnotes at end of table III.

TABLE III. Group A inspection for device type 02 - Continued.
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit
			Case 2 1/	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20				
			Test no.	$\overline{CLR}$	1Q	1 $\overline{Q}$	1D	2D	2 $\overline{Q}$	2Q	GND	CLK	3Q	3 $\overline{Q}$	3D	4D	4 $\overline{Q}$	4Q	V_{CC}		Min	Max	
1	I_{IH2}	3010	43	7.0 V							GND								5.5 V	$\overline{CLR}$		100	µA
Tc = 25°C		"	44				7.0 V				"								"	1D		"	"
		"	45					7.0 V			"								"	2D		"	"
		"	46								"	7.0 V							"	CLK		"	"
		"	47								"				7.0 V				"	3D		"	"
		"	48								"					7.0 V			"	4D		"	"
	I_O 4/	3011	49	4.5 V	2.25 V		4.5 V				"	2/							"	1Q	-20	-112	mA
		"	50	"		2.25 V	GND				"	"							"	1 $\overline{Q}$	"	"	"
		"	51	"				4.5 V		2.25 V	"	"							"	2Q	"	"	"
		"	52	"				GND	2.25 V		"	"							"	2 $\overline{Q}$	"	"	"
		"	53	"							"	"	2.25 V		4.5 V				"	3Q	"	"	"
		"	54	"							"	"		2.25 V	GND				"	3 $\overline{Q}$	"	"	"
		"	55	"							"	"				4.5 V		2.25 V	"	4Q	"	"	"
		"	56	"							"	"				GND	2.25 V		"	4 $\overline{Q}$	"	"	"
	I_{CC}	3005	57	GND			GND	GND			"	"			GND	GND			"	V_{CC}		14	"
2	Same tests, terminal conditions, and limits as subgroup 1, except T_C = +125°C and V_{IC} tests are omitted.																						
3	Same tests, terminal conditions, and limits as subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																						
7	Truth	3014	58	B	L	H	A	A	H	L	GND	B	L	H	A	A	H	L	4.5 V				
T_C = 25°C	table	"	59	A	H	L	A	A	L	H	"	A	H	L	A	A	L	H	"	7/			
	tests	"	60	"	H	L	B	B	L	H	"	B	H	L	B	B	L	H	"				
		"	61	"	L	H	B	B	H	L	"	A	L	H	B	B	H	L	"				
		"	62	"	L	H	A	A	H	L	"	B	L	H	A	A	H	L	"				
		"	63	"	H	L	"	"	L	H	"	A	H	L	A	A	L	H	"				
		"	64	B	L	H	"	"	H	L	"	B	L	H	A	A	H	L	"				
		"	65	B	L	H	"	"	H	L	"	A	L	H	A	A	H	L	"				
		"	66	B	L	H	"	"	H	L	"	B	L	H	A	A	H	L	"				
8	Same tests and terminal conditions as subgroup 7, except T_C = +125°C and -55°C.																						
9	f_{MAX}	3003	67	3.0 V	OUT		IN				GND	IN							5.0 V	1Q	50		MHz
Tc = 25°C	3/	(fig. 4)	68	"		OUT	IN				"	"							"	1 $\overline{Q}$	"		"
		"	69	"				IN		OUT	"	"							"	2Q	"		"
		"	70	"				IN	OUT		"	"							"	2 $\overline{Q}$	"		"
		"	71	"							"	"	OUT		IN				"	3Q	"		"
		"	72	"							"	"		OUT	IN				"	3 $\overline{Q}$	"		"
		"	73	"							"	"				IN		OUT	"	4Q	"		"
		"	74	"							"	"				IN	OUT		"	4 $\overline{Q}$	"		"
	t_{PLH1}	"	75	"	OUT		IN				"	"							"	CLK to 1Q	3	14	ns
		"	76	"				IN		OUT	"	"							"	CLK to 2Q	"	"	"
		"	77	"							"	"	OUT		IN				"	CLK to 3Q	"	"	"
		"	78	"							"	"				IN		OUT	"	CLK to 4Q	"	"	"
		"	79	"		OUT	IN				"	"							"	CLK to 1 $\overline{Q}$	"	"	"
		"	80	"				IN	OUT		"	"							"	CLK to 2 $\overline{Q}$	"	"	"
		"	81	"							"	"		OUT	IN				"	CLK to 3 $\overline{Q}$	"	"	"
		"	82	"							"	"				IN	OUT		"	CLK to 4 $\overline{Q}$	"	"	"

See footnotes at end of table III.

TABLE III. Group A inspection for device type 02 - Continued.
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit
			Case 2 1/	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20				
			Test no.	$\overline{CLR}$	1Q	1 $\overline{Q}$	1D	2D	2 $\overline{Q}$	2Q	GND	CLK	3Q	3 $\overline{Q}$	3D	4D	4 $\overline{Q}$	4Q	V_{CC}		Min	Max	
9 Tc = 25°C	t_{PHL1}	3003 (fig. 4)	83	3.0 V	OUT		IN				GND	IN							5.0 V	CLK to 1Q	5	20	ns
			84	"				IN		OUT	"	"							"	CLK to 2Q	"	"	"
			85	"							"	"	OUT		IN				"	CLK to 3Q	"	"	"
			86	"							"	"				IN		OUT	"	CLK to 4Q	"	"	"
			87	"		OUT	IN				"	"							"	CLK to 1 $\overline{Q}$	"	"	"
			88	"				IN	OUT		"	"							"	CLK to 2 $\overline{Q}$	"	"	"
			89	"							"	"		OUT	IN				"	CLK to 3 $\overline{Q}$	"	"	"
			90	"							"	"				IN	OUT		"	CLK to 4 $\overline{Q}$	"	"	"
	t_{PLH4}	"	91	IN		OUT	3.0 V				"	2/							"	CLR to 1 $\overline{Q}$	5	18	"
			92	"				3.0 V	OUT		"	"							"	CLR to 2 $\overline{Q}$	"	"	"
			93	"							"	"		OUT	3.0 V				"	CLR to 3 $\overline{Q}$	"	"	"
			94	"							"	"				3.0 V	OUT		"	CLR to 4 $\overline{Q}$	"	"	"
	t_{PHL4}	"	95	"	OUT		3.0 V				"	"							"	CLR to 1Q	8	23	"
			96	"				3.0 V		OUT	"	"							"	CLR to 2Q	"	"	"
			97	"							"	"	OUT		3.0 V				"	CLR to 3Q	"	"	"
			98	"							"	"				3.0 V		OUT	"	CLR to 4Q	"	"	"
10	f_{MAX}	Same tests and terminal conditions as for subgroup 9, except T_C = +125°C.																			40		MHz
	t_{PLH1}																				3	17	ns
	t_{PHL1}																				5	26	"
	t_{PLH4}																				5	20	"
	t_{PHL4}																				8	26	"
11	Same tests, terminal conditions and limits as for subgroup 10, except T_C = -55°C.																						

1/ Terminals not referenced are N/C.
2/ Apply  2.0 V min/4.5 V max (pulse, prior to test).
-- 0 V
3/ I_{IL} limits shall be as follows:

Parameters		Min/Max limits in µA for circuit		
		A	B	C
I_{IL}	D-inputs	0/-100		
	CLK/CLR	0/-150		

4/ Method 3011 of MIL-STD-883 shall be used, except the output shall be as specified herein, and the output current shall be operating rather than short circuit current. The output conditions have been chosen to produce a current that closely approximates one half of the true short circuit output current, I_{OS}.
5/ Tests shall be performed in sequence, attributes data only.
6/ A = 2.4 V minimum, B = 0.4 V.
7/ H > 1.5 V, L < 1.5 V.
8/ f_{MAX} minimum limit specified is the frequency of the input pulse. The output frequency shall be one-half of the input frequency.

TABLE III. Group A inspection for device type 03.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883	Cases R, S, 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured	Test limits		Unit
		method	Test no.	$\overline{OC}$	1Q	1D	2D	2Q	3Q	3D	4D	4Q	GND	ENC	5Q	5D	6D	6Q	7Q	7D	8D	8Q	V_{CC}	terminal	Min	Max	
1	V_{OH}	3006	1	0.8 V	-1 mA	2.0 V							GND	2.0 V									4.5 V	1Q	2.4		V
Tc = 25°C		"	2	"			2.0 V	-1 mA					"	"									"	2Q	"		"
		"	3	"					-1 mA	2.0 V			"	"									"	3Q	"		"
		"	4	"							2.0 V	-1 mA	"	"									"	4Q	"		"
		"	5	"									"	"	-1 mA	2.0 V							"	5Q	"		"
		"	6	"									"	"			2.0 V	-1 mA					"	6Q	"		"
		"	7	"									"	"					-1 mA	2.0 V			"	7Q	"		"
		"	8	"									"	"							2.0 V	-1 mA	"	8Q	"		"
	V_{OL}	3007	9	"	12 mA	0.8 V							"	"									"	1Q		0.4	"
		"	10	"			0.8 V	12 mA					"	"									"	2Q		"	"
		"	11	"					12 mA	0.8 V			"	"									"	3Q		"	"
		"	12	"							0.8 V	12 mA	"	"									"	4Q		"	"
		"	13	"									"	"	12 mA	0.8 V							"	5Q		"	"
		"	14	"									"	"			0.8 V	12 mA					"	6Q		"	"
		"	15	"									"	"					12 mA	0.8 V			"	7Q		"	"
		"	16	"									"	"							0.8 V	12 mA	"	8Q		"	"
	V_{IC}		17	-18 mA									"										"	$\overline{OC}$		-1.5	"
			18			-18 mA							"										"	1D		"	"
			19				-18 mA						"										"	2D		"	"
			20							-18 mA			"										"	3D		"	"
			21								-18 mA		"										"	4D		"	"
			22										"	-18 mA									"	ENC		"	"
			23										"			-18 mA							"	5D		"	"
			24										"				-18 mA						"	6D		"	"
			25										"							-18 mA			"	7D		"	"
			26										"								-18 mA		"	8D		"	"
	I_{IL}	3009	27	0.4 V									"										"	$\overline{OC}$	1/	1/	µA
		"	28			0.4 V							"										"	1D		"	"
		"	29				0.4 V						"										"	2D		"	"
		"	30							0.4 V			"										"	3D		"	"
		"	31								0.4 V		"										"	4D		"	"
		"	32										"	0.4 V									"	ENC		"	"
		"	33										"			0.4 V							"	5D		"	"
		"	34										"				0.4 V						"	6D		"	"
		"	35										"							0.4 V			"	7D		"	"
		"	36										"								0.4 V		"	8D		"	"
	I_{IH1}	3010	37	2.7 V									"										5.5 V	$\overline{OC}$		20	µA
		"	38			2.7 V							"										"	1D		"	"
		"	39				2.7 V						"										"	2D		"	"
		"	40							2.7 V			"										"	3D		"	"
		"	41								2.7 V		"										"	4D		"	"
		"	42										"	2.7 V									"	ENC		"	"
		"	43										"			2.7 V							"	5D		"	"
		"	44										"				2.7 V						"	6D		"	"
		"	45										"							2.7 V			"	7D		"	"
		"	46										"								2.7 V		"	8D		"	"
	I_{IH2}	"	47	7.0 V									"										"	$\overline{OC}$		100	"
		"	48			7.0 V							"										"	1D		"	"
		"	49				7.0 V						"										"	2D		"	"
		"	50							7.0 V			"										"	3D		"	"
		"	51								7.0 V		"										"	4D		"	"
		"	52										"	7.0 V									"	ENC		"	"
		"	53										"			7.0 V							"	5D		"	"
		"	54										"				7.0 V						"	6D		"	"
		"	55										"							7.0 V			"	7D		"	"
		"	56										"								7.0 V		"	8D		"	"

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 03.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases R, S, 2 Test no.	1 $\overline{OC}$	2 1Q	3 1D	4 2D	5 2Q	6 3Q	7 3D	8 4D	9 4Q	10 GND	11 ENC	12 5Q	13 5D	14 6D	15 6Q	16 7Q	17 7D	18 8D	19 8Q	20 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
1	I_{OZL}		57	2.0 V	0.4 V	2.0 V							GND										5.5 V	1Q		-20	µA
Tc = 25°C			58	"			2.0 V	0.4 V					"										"	2Q		"	"
			59	"					0.4 V	2.0 V			"										"	3Q		"	"
			60	"							2.0 V	0.4 V	"										"	4Q		"	"
			61	"									"		0.4 V	2.0 V							"	5Q		"	"
			62	"									"				2.0 V	0.4 V					"	6Q		"	"
			63	"									"						0.4 V	2.0 V			"	7Q		"	"
			64	"									"								2.0 V	0.4 V	"	8Q		"	"
	I_{OZH}		65	"	2.7 V	0.8 V							"										"	1Q		20	"
			66	"			0.8 V	2.7 V					"										"	2Q		"	"
			67	"					2.7 V	0.8 V			"										"	3Q		"	"
			68	"							0.8 V	2.7 V	"										"	4Q		"	"
			69	"									"		2.7 V	0.8 V							"	5Q		"	"
			70	"									"				0.8 V	2.7 V					"	6Q		"	"
			71	"									"						2.7 V	0.8 V			"	7Q		"	"
			72	"									"								0.8 V	2.7 V	"	8Q		"	"
	I_O 2/	3011	73	GND	2.25 V	4.5 V							"	4.5 V									"	1Q	-20	-112	mA
	"	"	74				4.5 V	2.25 V					"	"									"	2Q	"	"	"
	"	"	75						2.25 V	4.5 V			"	"									"	3Q	"	"	"
	"	"	76								4.5 V	2.25 V	"	"									"	4Q	"	"	"
	"	"	77	GND									"	"	2.25 V	4.5 V							"	5Q	"	"	"
	"	"	78	"									"	"			4.5 V	2.25 V					"	6Q	"	"	"
	"	"	79	"									"	"					2.25 V	4.5 V			"	7Q	"	"	"
	"	"	80	"									"	"							4.5 V	2.25 V	"	8Q	"	"	"
	I_{CCH}	3005	81	"		4.5 V	4.5 V			4.5 V	4.5 V		"	"		4.5 V	4.5 V			4.5 V	4.5 V		"	V_{CC}		16	"
	I_{CCL}	"	82	"		GND	GND			GND	GND		"	"		GND	GND			GND	GND		"	V_{CC}		25	"
	I_{CCZ}	"	83	4.5 V		4.5 V	4.5 V			4.5 V	4.5 V		"			4.5 V	4.5 V			4.5 V	4.5 V		"	V_{CC}		27	"
2	Same tests, terminal conditions, and limits as subgroup 1, except T_C = +125°C and V_{IC} tests are omitted.																										
3	Same tests, terminal conditions, and limits as subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																										
7	Truth	3014	84	B	H	A	A	H	H	A	A	H	GND	A	H	A	A	H	H	A	A	H	4.5 V				
Tc = 25°C	table	"	85	"	L	B	B	L	L	B	B	L	"	A	L	B	B	L	L	B	B	L	"				
	tests	"	86	"	L	B	B	L	L	B	B	L	"	B	L	B	B	L	L	B	B	L	"	5/			
	3/ 4/	"	87	"	L	A	A	L	L	A	A	L	"	B	L	A	A	L	L	A	A	L	"				
		"	88	"	H	A	A	H	H	A	A	H	"	A	H	A	A	H	H	A	A	H	"				
		"	89	"	H	A	A	H	H	A	A	H	"	B	H	A	A	H	H	A	A	H	"				
		"	90	"	H	B	B	H	H	B	B	H	"	B	H	B	B	H	H	B	B	H	"				
8	Same tests and terminal conditions as subgroup 7, except T_C = +125°C and -55°C.																										
9	t_{PLH2}	3003	91	GND	OUT	IN							GND	IN									5.0 V	1D to 1Q	2	12	ns
Tc = 25°C		(fig. 5)	92	"			IN	OUT					"	"									"	2D to 2Q	"	"	"
		"	93	"					OUT	IN			"	"									"	3D to 3Q	"	"	"
		"	94	"							IN	OUT	"	"									"	4D to 4Q	"	"	"
		"	95	"									"	"	OUT	IN							"	5D to 5Q	"	"	"
		"	96	"									"	"			IN	OUT					"	6D to 6Q	"	"	"
		"	97	"									"	"					OUT	IN			"	7D to 7Q	"	"	"
		"	98	"									"	"							IN	OUT	"	8D to 8Q	"	"	"
	t_{PHL2}	"	99	"	OUT	IN							"	"									"	1D to 1Q	4	16	"
		"	100	"			IN	OUT					"	"									"	2D to 2Q	"	"	"
		"	101	"					OUT	IN			"	"									"	3D to 3Q	"	"	"
		"	102	"							IN	OUT	"	"									"	4D to 4Q	"	"	"
		"	103	"									"	"	OUT	IN							"	5D to 5Q	"	"	"
		"	104	"									"	"			IN	OUT					"	6D to 6Q	"	"	"
		"	105	"									"	"					OUT	IN			"	7D to 7Q	"	"	"
		"	106	"									"	"							IN	OUT	"	8D to 8Q	"	"	"

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883	Cases R, S, 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured	Test limits		Unit
		method	Test no.	$\overline{OC}$	1Q	1D	2D	2Q	3Q	3D	4D	4Q	GND	ENC	5Q	5D	6D	6Q	7Q	7D	8D	8Q	V_{CC}	terminal	Min	Max	
9	t_{PLH3}	3003	107	GND	OUT	3.0 V							GND	IN									5.0 V	ENC to 1Q	6	18	ns
Tc = 25°C		(fig. 5)	108	"			3.0 V	OUT					"	"									"	ENC to 2Q	"	"	"
		"	109	"					OUT	3.0 V			"	"									"	ENC to 3Q	"	"	"
		"	110	"							3.0 V	OUT	"	"									"	ENC to 4Q	"	"	"
		"	111	"									"	"	OUT	3.0 V							"	ENC to 5Q	"	"	"
		"	112	"									"	"			3.0 V	OUT					"	ENC to 6Q	"	"	"
		"	113	"									"	"					OUT	3.0 V			"	ENC to 7Q	"	"	"
		"	114	"									"	"							3.0 V	OUT	"	ENC to 8Q	"	"	"
	t_{PHL3}	"	115	"	OUT	GND							"	"									"	ENC to 1Q	7	18	"
		"	116	"			GND	OUT					"	"									"	ENC to 2Q	"	"	"
		"	117	"					OUT	GND			"	"									"	ENC to 3Q	"	"	"
		"	118	"							GND	OUT	"	"									"	ENC to 4Q	"	"	"
		"	119	"									"	"	OUT	GND							"	ENC to 5Q	"	"	"
		"	120	"									"	"			GND	OUT					"	ENC to 6Q	"	"	"
		"	121	"									"	"					OUT	GND			"	ENC to 7Q	"	"	"
		"	122	"									"	"							GND	OUT	"	ENC to 8Q	"	"	"
	t_{PZH}	"	123	IN	OUT	3.0 V							"										"	$\overline{OC}$ to 1Q	5	18	"
		"	124	"			3.0 V	OUT					"										"	$\overline{OC}$ to 2Q	"	"	"
		"	125	"					OUT	3.0 V			"										"	$\overline{OC}$ to 3Q	"	"	"
		"	126	"							3.0 V	OUT	"										"	$\overline{OC}$ to 4Q	"	"	"
		"	127	"									"		OUT	3.0 V							"	$\overline{OC}$ to 5Q	"	"	"
		"	128	"									"				3.0 V	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	129	"									"						OUT	3.0 V			"	$\overline{OC}$ to 7Q	"	"	"
		"	130	"									"								3.0 V	OUT	"	$\overline{OC}$ to 8Q	"	"	"
	t_{PZL}	"	131	"	OUT	GND							"										"	$\overline{OC}$ to 1Q	6	18	"
		"	132	"			GND	OUT					"										"	$\overline{OC}$ to 2Q	"	"	"
		"	133	"					OUT	GND			"										"	$\overline{OC}$ to 3Q	"	"	"
		"	134	"							GND	OUT	"										"	$\overline{OC}$ to 4Q	"	"	"
		"	135	"									"		OUT	GND							"	$\overline{OC}$ to 5Q	"	"	"
		"	136	"									"				GND	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	137	"									"						OUT	GND			"	$\overline{OC}$ to 7Q	"	"	"
		"	138	"									"								GND	OUT	"	$\overline{OC}$ to 8Q	"	"	"
	t_{PHZ}	"	139	"	OUT	3.0 V							"										"	$\overline{OC}$ to 1Q	2	10	"
		"	140	"			3.0 V	OUT					"										"	$\overline{OC}$ to 2Q	"	"	"
		"	141	"					OUT	3.0 V			"										"	$\overline{OC}$ to 3Q	"	"	"
		"	142	"							3.0 V	OUT	"										"	$\overline{OC}$ to 4Q	"	"	"
		"	143	"									"		OUT	3.0 V							"	$\overline{OC}$ to 5Q	"	"	"
		"	144	"									"				3.0 V	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	145	"									"						OUT	3.0 V			"	$\overline{OC}$ to 7Q	"	"	"
		"	146	"									"								3.0 V	OUT	"	$\overline{OC}$ to 8Q	"	"	"

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883	Cases R, S, 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured	Test limits		Unit
		method	Test no.	$\overline{OC}$	1Q	1D	2D	2Q	3Q	3D	4D	4Q	GND	ENC	5Q	5D	6D	6Q	7Q	7D	8D	8Q	V_{CC}	terminal	Min	Max	
9	t_{PLZ}	3003	147	IN	OUT	GND							GND										5.0 v	$\overline{OC}$ to 1Q	2	12	ns
Tc = 25°C		(fig. 5)	148	"			GND	OUT					"										"	$\overline{OC}$ to 2Q	"	"	"
		"	149	"					OUT	GND			"										"	$\overline{OC}$ to 3Q	"	"	"
		"	150	"							GND	OUT	"										"	$\overline{OC}$ to 4Q	"	"	"
		"	151	"									"		OUT	GND							"	$\overline{OC}$ to 5Q	"	"	"
		"	152	"									"				GND	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	153	"									"						OUT	GND			"	$\overline{OC}$ to 7Q	"	"	"
		"	154	"									"								GND	OUT	"	$\overline{OC}$ to 8Q	"	"	"
10	t_{PLH2}	Same tests and terminal conditions as subgroup 9, except TC = +125°C.																							2	14	"
	t_{PHL2}																								4	19	"
	t_{PLH3}																								6	21	"
	t_{PHL3}																								7	21	"
	t_{PZH}																								5	26	"
	t_{PZL}																								6	22	"
	t_{PHZ}																								2	12	"
	t_{PLZ}																								2	18	"
11	Same tests as subgroup 10, except T_C = -55°C and use limits from table I.																										

1/ I_{IL} limits shall be as follows:

Parameters	Min/Max limits in µA for circuit		
	A	B	C
I_{IL}	0/-200		

2/ Method 3011 of MIL-STD-883 shall be used, except the output shall be as specified herein, and the output current shall be operating rather than short circuit current. The output conditions have been chosen to produce a current that closely approximates one half of the true short circuit output current, I_{OS}.

3/ Tests shall be performed in sequence, attributes data only.

4/ A = 2.4 V and B = 0.4 V.

5/ H > 1.5 V, L < 1.5 V.

TABLE III. Group A inspection for device type 04.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883	Cases R, S, 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured	Test limits		Unit
		method	Test no.	$\overline{OC}$	1Q	1D	2D	2Q	3Q	3D	4D	4Q	GND	CLK	5Q	5D	6D	6Q	7Q	7D	8D	8Q	V_{CC}	terminal	Min	Max	
1	V_{OH}	3006	1	0.8 V	-1 mA	2.0 V							GND	1/									4.5 V	1Q	2.4		V
Tc = 25°C		"	2	"			2.0 V	-1 mA					"	"									"	2Q	"		"
		"	3	"					-1 mA	2.0 V			"	"									"	3Q	"		"
		"	4	"							2.0 V	-1 mA	"	"									"	4Q	"		"
		"	5	"									"	"	-1 mA	2.0 V							"	5Q	"		"
		"	6	"									"	"			2.0 V	-1 mA					"	6Q	"		"
		"	7	"									"	"					-1 mA	2.0 V			"	7Q	"		"
		"	8	"									"	"							2.0 V	-1 mA	"	8Q	"		"
	V_{OL}	3007	9	"	12 mA	0.8 V							"	"									"	1Q		0.4	"
		"	10	"			0.8 V	12 mA					"	"									"	2Q		"	"
		"	11	"					12 mA	0.8 V			"	"									"	3Q		"	"
		"	12	"							0.8 V	12 mA	"	"									"	4Q		"	"
		"	13	"									"	"	12 mA	0.8 V							"	5Q		"	"
		"	14	"									"	"			0.8 V	12 mA					"	6Q		"	"
		"	15	"									"	"					12 mA	0.8 V			"	7Q		"	"
		"	16	"									"	"							0.8 V	12 mA	"	8Q		"	"
	V_{IC}		17	-18 mA									"										"	$\overline{OC}$		-1.5	"
			18			-18 mA							"										"	1D		"	"
			19				-18 mA						"										"	2D		"	"
			20							-18 mA			"										"	3D		"	"
			21								-18 mA		"										"	4D		"	"
			22										"	-18 mA									"	CLK		"	"
			23										"			-18 mA							"	5D		"	"
			24										"				-18 mA						"	6D		"	"
			25										"							-18 mA			"	7D		"	"
			26										"								-18 mA		"	8D		"	"
	I_{IL}	3009	27	0.4 V									"										5.5 V	$\overline{OC}$	2/	2/	µA
		"	28			0.4 V							"										"	1D		"	"
		"	29				0.4 V						"										"	2D		"	"
		"	30							0.4 V			"										"	3D		"	"
		"	31								0.4 V		"										"	4D		"	"
		"	32										"	0.4 V									"	CLK		"	"
		"	33										"			0.4 V							"	5D		"	"
		"	34										"				0.4 V						"	6D		"	"
		"	35										"							0.4 V			"	7D		"	"
		"	36										"								0.4 V		"	8D		"	"
	I_{IH1}	3010	37	2.7 V									"										"	$\overline{OC}$		20	µA
		"	38			2.7 V							"										"	1D		"	"
		"	39				2.7 V						"										"	2D		"	"
		"	40							2.7 V			"										"	3D		"	"
		"	41								2.7 V		"										"	4D		"	"
		"	42										"	2.7 V									"	CLK		"	"
		"	43										"			2.7 V							"	5D		"	"
		"	44										"				2.7 V						"	6D		"	"
		"	45										"							2.7 V			"	7D		"	"
		"	46										"								2.7 V		"	8D		"	"
	I_{IH2}	"	47	7.0 V									"										"	$\overline{OC}$		100	"
		"	48			7.0 V							"										"	1D		"	"
		"	49				7.0 V						"										"	2D		"	"
		"	50							7.0 V			"										"	3D		"	"
		"	51								7.0 V		"										"	4D		"	"
		"	52										"	7.0 V									"	CLK		"	"
		"	53										"			7.0 V							"	5D		"	"
		"	54										"				7.0 V						"	6D		"	"
		"	55										"							7.0 V			"	7D		"	"
		"	56										"								7.0 V		"	8D		"	"

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 04.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases R, S, 2 Test no.	1 $\overline{OC}$	2 1Q	3 1D	4 2D	5 2Q	6 3Q	7 3D	8 4D	9 4Q	10 GND	11 CLK	12 5Q	13 5D	14 6D	15 6Q	16 7Q	17 7D	18 8D	19 8Q	20 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
1	I_{OZL}		57	2.0 V	0.4 V	2.0 V							GND	1/									5.5 V	1Q		-20	µA
Tc = 25°C			58	"			2.0 V	0.4 V					"	"									"	2Q		"	"
			59	"					0.4 V	2.0 V			"	"									"	3Q		"	"
			60	"							2.0 V	0.4 V	"	"									"	4Q		"	"
			61	"									"	"	0.4 V	2.0 V							"	5Q		"	"
			62	"									"	"			2.0 V	0.4 V					"	6Q		"	"
			63	"									"	"					0.4 V	2.0 V			"	7Q		"	"
			64	"									"	"							2.0 V	0.4 V	"	8Q		"	"
	I_{OZH}		65	"	2.7 V	0.8 V							"	"									"	1Q		20	"
			66	"			0.8 V	2.7 V					"	"									"	2Q		"	"
			67	"					2.7 V	0.8 V			"	"									"	3Q		"	"
			68	"							0.8 V	2.7 V	"	"									"	4Q		"	"
			69	"									"	"	2.7 V	0.8 V							"	5Q		"	"
			70	"									"	"			0.8 V	2.7 V					"	6Q		"	"
			71	"									"	"					2.7 V	0.8 V			"	7Q		"	"
			72	"									"	"							0.8 V	2.7 V	"	8Q		"	"
	I_O 3/	3011	73	GND	2.25 V	4.5 V							"	"									"	1Q	-20	-112	mA
	"	"	74				4.5 V	2.25 V					"	"									"	2Q	"	"	"
	"	"	75						2.25 V	4.5 V			"	"									"	3Q	"	"	"
	"	"	76								4.5 V	2.25 V	"	"									"	4Q	"	"	"
	"	"	77	GND									"	"	2.25 V	4.5 V							"	5Q	"	"	"
	"	"	78	"									"	"			4.5 V	2.25 V					"	6Q	"	"	"
	"	"	79	"									"	"					2.25 V	4.5 V			"	7Q	"	"	"
	"	"	80	"									"	"							4.5 V	2.25 V	"	8Q	"	"	"
	I_{CCH}	3005	81	"		4.5 V	4.5 V			4.5 V	4.5 V		"	"		4.5 V	4.5 V			4.5 V			4.5 V	"	V_{CC}		19	"
	I_{CCL}	"	82	"		GND	GND			GND	GND		"	"		GND	GND			GND	GND		"	V_{CC}		28	"
	I_{CCZ}	"	83	4.5 V		GND	GND			GND	GND		"			GND	GND			GND	GND		"	V_{CC}		31	"
2	Same tests, terminal conditions, and limits as subgroup 1, except T_C = +125°C and V_{IC} tests are omitted.																										
3	Same tests, terminal conditions, and limits as subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																										
7	Truth	3014	84	B	X 6/	A	A	X 6/	X 6/	A	A	X 6/	GND	B	X 6/	A	A	X 6/	X 6/	A	A	X 6/	4.5 V				
Tc = 25°C	table	"	85	"	H	A	A	H	H	A	A	H	"	A	H	A	A	H	H	A	A	H	"				
	tests	"	86	"	"	B	B	"	"	B	B	"	"	A	H	B	B	H	H	B	B	H	"	7/			
	4/ 5/	"	87	"	"	"	"	"	"	"	"	"	"	B	H	B	B	H	H	B	B	H	"				
		"	88	"	L	"	"	L	L	"	"	L	"	A	L	B	B	L	L	B	B	L	"				
		"	89	"	L	A	A	L	L	A	A	L	"	B	L	A	A	L	L	A	A	L	"				
		"	90	"	H	A	A	H	H	A	A	H	"	A	H	A	A	H	H	A	A	H	"				
8	Same tests and terminal conditions as subgroup 7, except T_C = +125°C and -55°C.																										
9	f_{MAX}	3003	91	GND	OUT	IN							GND	IN									5.0 V	1Q	35		MHz
Tc = 25°C	8/	(fig. 6)	92	"			IN	OUT					"	"									"	2Q	"		"
	"	"	93	"					OUT	IN			"	"									"	3Q	"		"
	"	"	94	"							IN	OUT	"	"									"	4Q	"		"
	"	"	95	"									"	"	OUT	IN							"	5Q	"		"
	"	"	96	"									"	"			IN	OUT					"	6Q	"		"
	"	"	97	"									"	"					OUT	IN			"	7Q	"		"
	"	"	98	"									"	"							IN	OUT	"	8Q	"		"
	t_{PLH1}	"	99	"	OUT	IN							"	"									"	CLK to 1Q	4	12	ns
	"	"	100	"			IN	OUT					"	"									"	CLK to 2Q	"	"	"
	"	"	101	"					OUT	IN			"	"									"	CLK to 3Q	"	"	"
	"	"	102	"							IN	OUT	"	"									"	CLK to 4Q	"	"	"
	"	"	103	"									"	"	OUT	IN							"	CLK to 5Q	"	"	"
	"	"	104	"									"	"			IN	OUT					"	CLK to 6Q	"	"	"
	"	"	105	"									"	"					OUT	IN			"	CLK to 7Q	"	"	"
	"	"	106	"									"	"							IN	OUT	"	CLK to 8Q	"	"	"

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 04.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases R, S, 2 Test no.	1 $\overline{OC}$	2 1Q	3 1D	4 2D	5 2Q	6 3Q	7 3D	8 4D	9 4Q	10 GND	11 CLK	12 5Q	13 5D	14 6D	15 6Q	16 7Q	17 7D	18 8D	19 8Q	20 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
9	t_{PHL1}	3003	107	GND	OUT	IN							GND	IN									5.0 V	CLK to 1Q	5	16	ns
Tc = 25°C		(fig. 6)	108	"			IN	OUT					"	"									"	CLK to 2Q	"	"	"
		"	109	"					OUT	IN			"	"									"	CLK to 3Q	"	"	"
		"	110	"							IN	OUT	"	"									"	CLK to 4Q	"	"	"
		"	111	"									"	"	OUT	IN							"	CLK to 5Q	"	"	"
		"	112	"									"	"			IN	OUT					"	CLK to 6Q	"	"	"
		"	113	"									"	"					OUT	IN			"	CLK to 7Q	"	"	"
		"	114	"									"	"							IN	OUT	"	CLK to 8Q	"	"	"
	t_{PZH}	"	115	IN	OUT	3.0 V							"	1/									"	$\overline{OC}$ to 1Q	3	17	"
		"	116	"			3.0 V	OUT					"	"									"	$\overline{OC}$ to 2Q	"	"	"
		"	117	"					OUT	3.0 V			"	"									"	$\overline{OC}$ to 3Q	"	"	"
		"	118	"							3.0 V	OUT	"	"									"	$\overline{OC}$ to 4Q	"	"	"
		"	119	"									"	"	OUT	3.0 V							"	$\overline{OC}$ to 5Q	"	"	"
		"	120	"									"	"			3.0 V	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	121	"									"	"					OUT	3.0 V			"	$\overline{OC}$ to 7Q	"	"	"
		"	122	"									"	"							3.0 V	OUT	"	$\overline{OC}$ to 8Q	"	"	"
	t_{PZL}	"	123	"	OUT	GND							"	"									"	$\overline{OC}$ to 1Q	5	18	"
		"	124	"			GND	OUT					"	"									"	$\overline{OC}$ to 2Q	"	"	"
		"	125	"					OUT	GND			"	"									"	$\overline{OC}$ to 3Q	"	"	"
		"	126	"							GND	OUT	"	"									"	$\overline{OC}$ to 4Q	"	"	"
		"	127	"									"	"	OUT	GND							"	$\overline{OC}$ to 5Q	"	"	"
		"	128	"									"	"			GND	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	129	"									"	"					OUT	GND			"	$\overline{OC}$ to 7Q	"	"	"
		"	130	"									"	"							GND	OUT	"	$\overline{OC}$ to 8Q	"	"	"
	t_{PHZ}	"	131	"	OUT	3.0 V							"	"									"	$\overline{OC}$ to 1Q	1	10	"
		"	132	"			3.0 V	OUT					"	"									"	$\overline{OC}$ to 2Q	"	"	"
		"	133	"					OUT	3.0 V			"	"									"	$\overline{OC}$ to 3Q	"	"	"
		"	134	"							3.0 V	OUT	"	"									"	$\overline{OC}$ to 4Q	"	"	"
		"	135	"									"	"	OUT	3.0 V							"	$\overline{OC}$ to 5Q	"	"	"
		"	136	"									"	"			3.0 V	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	137	"									"	"					OUT	3.0 V			"	$\overline{OC}$ to 7Q	"	"	"
		"	138	"									"	"							3.0 V	OUT	"	$\overline{OC}$ to 8Q	"	"	"

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 04.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.8 V; or open).

Subgroup	Symbol	MIL-STD-883	Cases R, S, 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured	Test limits		Unit
		method	Test no.	$\overline{OC}$	1Q	1D	2D	2Q	3Q	3D	4D	4Q	GND	CLK	5Q	5D	6D	6Q	7Q	7D	8D	8Q	V_{CC}	terminal	Min	Max	
9	t_{PLZ}	3003	139	IN	OUT	GND							GND	1/									5.0 v	$\overline{OC}$ to 1Q	2	18	ns
Tc = 25°C		(fig. 6)	140	"			GND	OUT					"	"									"	$\overline{OC}$ to 2Q	"	"	"
		"	141	"					OUT	GND			"	"									"	$\overline{OC}$ to 3Q	"	"	"
		"	142	"							GND	OUT	"	"									"	$\overline{OC}$ to 4Q	"	"	"
		"	143	"									"	"	OUT	GND							"	$\overline{OC}$ to 5Q	"	"	"
		"	144	"									"	"			GND	OUT					"	$\overline{OC}$ to 6Q	"	"	"
		"	145	"									"	"					OUT	GND			"	$\overline{OC}$ to 7Q	"	"	"
		"	146	"									"	"							GND	OUT	"	$\overline{OC}$ to 8Q	"	"	"
10	f_{MAX}	Same tests and terminal conditions as subgroup 9, except TC = +125°C.																							30		MHz
	t_{PLH1}																								4	20	ns
	t_{PHL1}																								5	18	"
	t_{PZH}																								5	22	"
	t_{PZL}																								7	20	"
	t_{PHZ}																								2	12	"
	t_{PLZ}																								3	24	"
11	Same tests as subgroup 10, except T_C = -55°C and use limits from table I.																										

1/ Apply  2.0 V min/4.5 V max -- 0 V (pulse, prior to test).

2/ I_{IL} limits shall be as follows:

Parameters	Min/Max limits in µA for circuit		
	A	B	C
I_{IL}	0/-200		

3/ Method 3011 of MIL-STD-883 shall be used, except the output shall be as specified herein, and the output current shall be operating rather than short circuit current. The output conditions have been chosen to produce a current that closely approximates one half of the true short circuit output current, I_{OS}.

4/ Tests shall be performed in sequence, attributes data only.

5/ A = 2.4 V, minimum, B = 0.4 V.

6/ X = indeterminate output voltage.

7/ H > 1.5 V, L < 1.5 V.

8/ f_{MAX} minimum limit specified is the frequency of the input pulse. The output frequency shall be one-half of the input frequency.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of the specification.

b. PIN and compliance identifier, if applicable (see 1.2).

c. Requirements for delivery of one copy of the conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

d. Requirements for certificate of compliance, if applicable.

e. Requirements for notification of change of product or process to contracting activity in addition to notification to the qualifying activity, if applicable.

f. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

g. Requirements for product assurance options.

h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.

i. Requirements for "JAN" marking.

j. Packaging requirements (see 5.1).

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43123-1199.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535, MIL-HDBK-1331, and as follows:

GND ..... Ground zero voltage potential
I_{IN} ..... Current flowing into an input terminal

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-35810 device types and may have slight physical variations in relation to case size. The presence of this information should not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-PRF-38535.

Military device type	Generic-industry type
01	54ALS174
02	54ALS175
03	54ALS373
04	54ALS374

6.8 Manufacturers' designation. Manufacturers' circuits which form a part of this specification are designated with an "X" as shown in table IV herein.

TABLE IV. Manufacturers' designations.

Device type	Circuits		
	A	B	C
	Texas Instruments	Motorola Inc.	National Semiconductor/ Fairchild Semiconductor
01	X		
02	X		
03	X		
04	X		

6.9 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5962-2054)

Review activities:
Army - MI, SM
Navy - AS, CG, MC, SH, TD
Air Force - 03, 19, 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at www.dodssp.daps.mil.